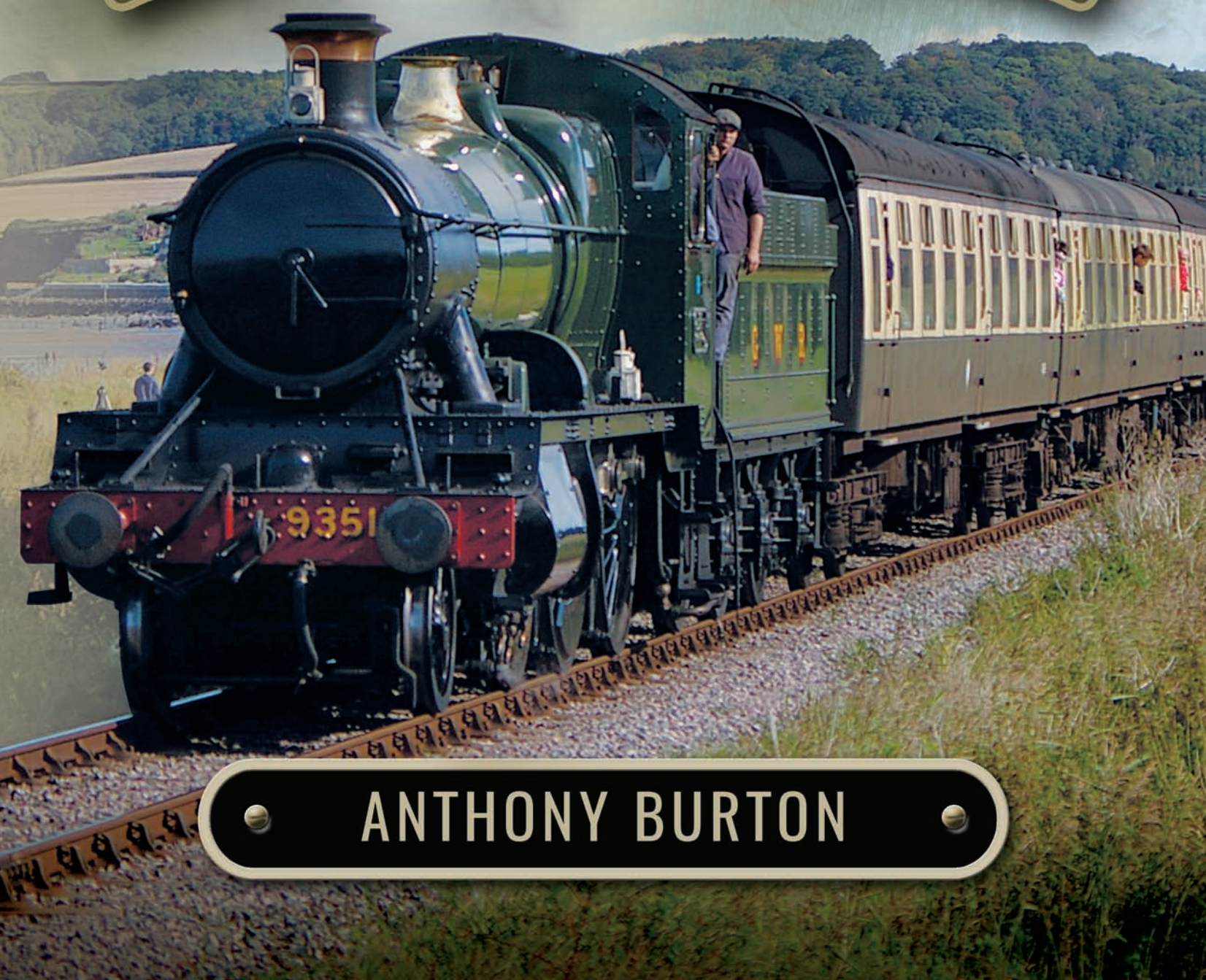


# A STEAM ENGINE PILGRIMAGE



ANTHONY BURTON

# A Steam Engine Pilgrimage





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# A Steam Engine Pilgrimage

Anthony Burton



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## Preface

These journeys through the world of steam were made during the spring and summer of 1986. They were never intended to be comprehensive, could not be comprehensive, or I should be travelling still. Rather, they represent a personal selection of railways, boats and all things steaming that have given me special pleasure. The selection was

also made to give at least an impression of the rich diversity of the subject. My steam journeyings began long before work started on this book and they will continue now that it is ended. This is a delectable slice from the middle of the steam pudding.

Anthony Burton

## Preface to the Second Edition

Most of this book first appeared under the title *Steaming Through Britain* that was first published twenty or so years ago. The main text has been kept largely unchanged: after all, it represents the description of visits made at a particular time, but where necessary a few bits and pieces have been added as updates. I have, however, added some new sections, not in an attempt to make the book more comprehensive, but because they seemed to fill gaps that needed filling. I have added the chapter on replicas simply because my involvement with these

machines proved to be immense good fun as well as being instructive. The fun element was also uppermost in my mind when writing about the lovely route to the sea, the West Somerset and added in a cruise past the site, down the Somerset coast – and the Welsh Highland is so much a part of the Ffestiniog system that I couldn't leave it out – in any case, how could a steam enthusiast resist the chance to visit a line with articulated Garratts. I hope readers will excuse me for adding one non-steaming steam engine.

## Chapter 1

### Waiting for the Train

Each summer, birds sing, flowers bloom and large numbers of men, and rather fewer women, clamber into boilersuits to shovel coal, to grease and clean machinery and to coax back into panting life engines which, by all the laws of logic, should have been consigned to the scrap heap. Several, indeed, have been sent for scrap only to be hauled out again and, with infinite labour, restored to their former glories. The steam enthusiasts are at work. Locomotives emerge from winter hibernation in their engine sheds. Traction engines lumber down country lanes, queues of motorists, frustrated or enchanted, behind them. Great beam engines nod their ponderous heads.

What is the appeal of steam? Why should so much love and affection be lavished on mere mechanical objects? The answers to these questions will, I hope, emerge during this description of a steam pilgrimage. There are those whose enthusiasm extends no further than one engine or, at most, one particular group of engines: the steam locomotive buffs, the beam engine enthusiasts, the potterers in steam launches. Others make no such distinction and need only a whiff of that heady mixture of smoke and hot oil to send them into ecstatic reveries. I count myself among their number. So, in these journeys, we shall meet engines of every kind and variety – but where does one start? Well, it seems a good idea to remind ourselves that the steam engine, now a rare and exotic creature, was once the common workhorse of Britain, and what could be more mundane a setting than the morning commuter train to London?

The 9.20 am from Didcot to Paddington attracts a large number of travellers; not because it is especially fast, for it is not, and certainly not for the standards of

comfort on offer. The carriages are of what one might describe as ‘a certain age’, and the characteristic sound they emit is a high-pitched twang as the aged springs respond to the arrival of a commuter bottom. Its main attraction is the price of the ticket, for this is the first train of the morning on which a cheap day-return is available. So when I have to visit London this is the train for me. I join other parsimonious passengers in the vast car park which, until recently, had the appearance of a battlefield after a heavy bombardment, for the whole surface was scarred and pitted with holes full of dark, oily water. It was not a sight to gladden the heart. But occasionally, just occasionally, I look across from the footbridge over the lines, over the trucks and wagons, to where a thin wisp of smoke rises up from a copper-capped chimney above a dark green boiler. Then Didcot does not mean British Rail 125s dashing off to Swindon and my morning train to Paddington, because the smoke that drifts across the lines carries something other than the smell of a steam locomotive – it brings the scent of nostalgia. In imagination one could leave BR to the present and turn back to the days of the Great Western Railway (GWR). Didcot Railway Centre has opened its doors for a journey into the past.

There are some centres and preserved lines whose main ambition is to re-create the pleasure of travel by steam railway, but this is not the principal aim at Didcot. Here they want to re-create the essence of the old GWR, probably the best loved railway in the world. And if you start as I did with a visit to the museum building, refusing to be side-tracked by the allures of gentle simmerings or the call to action



of the steam whistle, you will discover something of the individual character of this special railway. You may not discover what made the Western Railway Great, but you will find something to suggest why so many accept the description. The GWR was adept at public relations long before British Rail came along with its strange slogans – ‘This is the Age of the Train’, as though the railways were a new invention or, worse, ‘We’re Getting There’. Yes, you long to say, but will you ever arrive?

The GWR promoters invested their railway with glamour, and they started as early as the 1890s. There was the promise of seaside holidays, touched with something more exotically European if you boarded the Cornish Riviera Express. That was followed by ‘The World’s Fastest Train’ – the Cheltenham Flyer. The railway was ‘merchandised’ before anyone had even heard the word: you could buy Great Western jigsaws; you could choose your holidays from *Holiday Haunts* which, needless to say, publicised only those attractive locations to be reached by the one railway; and rail enthusiasts could read *The Great Western Magazine*. It was the railway, above all others, which set out to fix an image in the public mind; just how well it succeeded can be judged from the vast array of GWR devotees who remain faithful long after its demise.

It started with an advantage, of course, for it was a line begun with reckless boldness by the most exciting engineer of the nineteenth century, Isambard Kingdom Brunel. Change came, more dramatically here perhaps than on any other line, but the imprint of the little man with the tall hat and the big cigar lingers still over all things Great Western. The GWR *was* unique: all the publicists had to do was make sure the world was aware of its uniqueness. That is the message Didcot still sends out today – and it does so by presenting the railway in historical perspective.

Didcot is a big site and it is easy to ramble around picking up fragments of the story where they lie – carriages awaiting restoration here, old station signs there, and afterwards a glimpse in the shed of dismembered locomotives. I rather enjoy such aimless meanderings, but I will bring a little order to the proceedings by going back to the beginnings of the Great Western.

Brunel was a man with breadth of vision: where lesser mortals were content to set rails 4 feet 8½ inches apart, for no better reason than that was the gauge of the colliery line where George Stephenson went to work on his steam locomotive, Brunel set out to discover what would be the best gauge for a railway. Width, he decided, was indeed the thing; a broad seven-foot gauge to provide an even ride at high speed, and the Great Western was built to that gauge. Whatever its virtues, the broad gauge suffered from one fatal disadvantage: too much money had been invested in what was being called the standard gauge. On 20 April 1892, the last of the broad gauge was removed. But at Didcot it has been revived and we can all stand and stare at the wide tracks and think what might have been.

In 1985, on the 150th anniversary of the GWR, a replica of one of the most famous of the old broad-gauge locomotives, *The Iron Duke*, arrived at Didcot. It came on a long, low truck and there, alas, it stayed. There was no suitable crane to lift it, and no one would lend a crane, without the exchange of a great deal of folding currency. The great anniversary came and went and *The Iron Duke* sulked on a siding like Achilles in his tent, unable to join the rest of the army of locomotives. The following year, however, all that changed and *The Iron Duke* charged up and down a short length of broad-gauge track in triumphal style. Today the locomotive no longer steams, but even as a static exhibit the old engine is still redolent of the great days of the



**The replica** of Daniel Gooch's *Iron Duke* in its new home at the National Railway Museum, York. (Richard Kelly)

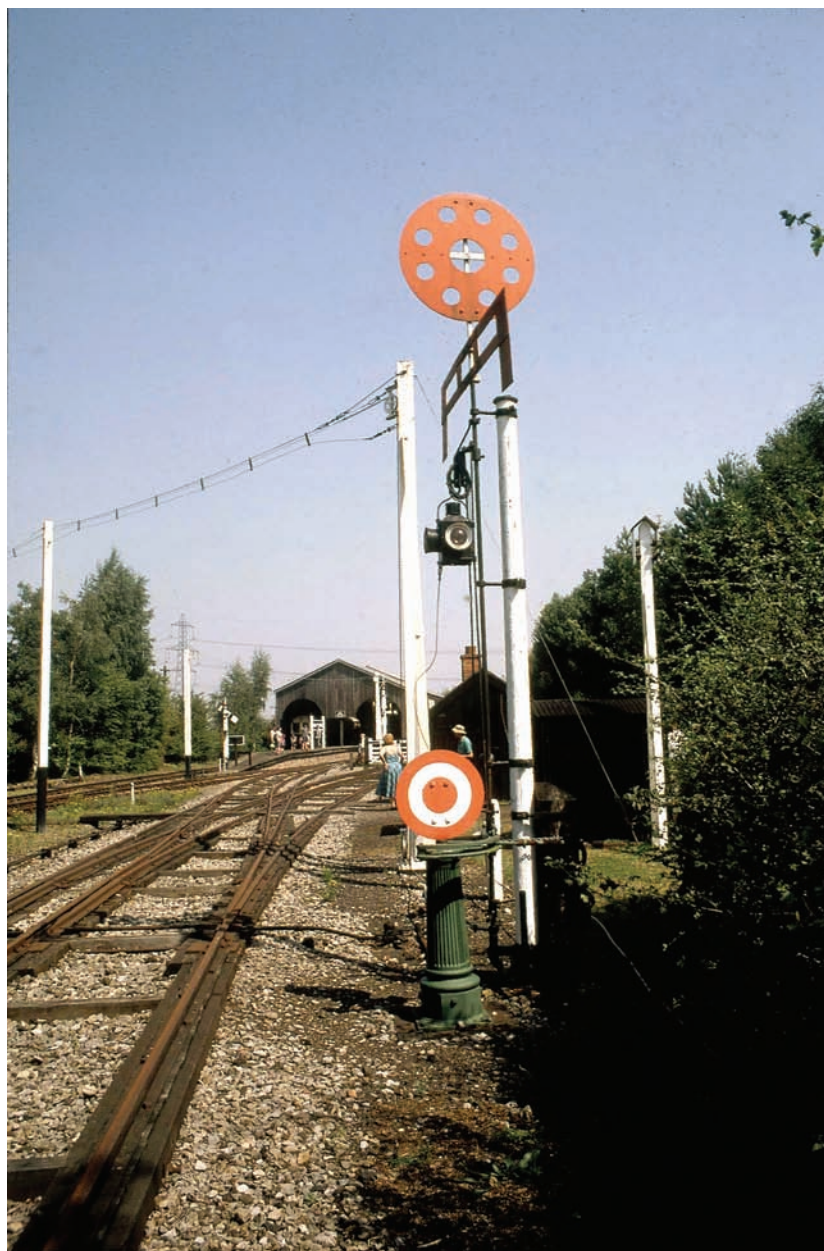
GWR and now has a new home at the National Railway Museum in York. There is, however, another replica of the broad gauge days, a Firefly class locomotive that is steamed on special occasions. And alongside the broad track is a reminder that not everything Brunel did was a huge success. There is a length of tubing from the ill-fated atmospheric railway that, for a brief period, extended the route westward from Exeter.

A visit from a broad-gauge locomotive is a rare event at Didcot, but the slimmer engines are regularly on display. With luck, the enthusiast can see the names that helped make the GWR famous – the Halls, the Castles, and the Kings, regal names for regal locomotives. But there is little room for steaming here, so one has the sensation of seeing a caged animal, like a great, sleek cat at a zoo. The tiger may be snoozing, the panther padding its confined home, but the watcher is never in doubt of the contained power waiting

to be released. Just occasionally, that steam power is let out as the engines head excursion trains to various parts of the country, but of that more later.

At Didcot, the visitor can poke and pry, and see something of the work going on in the sheds. A stripped-down locomotive is not always the loveliest of beasts. Rusty iron, dull steel and greasy brass are not appealing, and rivets and stays, while they have their admirers, are not noted for their beauty. Yet, given time, patience, money and a great deal of work, the most unpromising of raw material is transformed. A splendidly colourful butterfly will emerge from the dull chrysalis. It is not the speediest work. One old engine was brought in to have a little work done to the springs, and it seemed sensible while it was there to have a go at the boiler, and then the valves, and so it has been going on for the last ten years. But no one minds very much. It is, after all, a labour of love.





**Memories of** broad gauge days: old GWR disc signals at Didcot. (Anthony Burton)

There are only a few permanent staff at Didcot, but the Great Western Society has over 4,000 members, and they can rely on getting a couple of hundred to help out when required. There are glamorous jobs, less glamorous jobs and a lot of hard, dirty jobs as well. Some of the

hardest work goes on in the workshops and I always enjoy a visit there. There is something awesome about the scale of these steam monsters, and the power they represent. There is tremendous satisfaction too in seeing a handsome carriage emerge from the bits and pieces that were once a farmer's henhouse, or a fine locomotive steam again when it had seemed destined for the cutting torch of the scrapyards. Look, for example, at the finest Didcot has to offer – *Dryslwyn Castle*. It could not be anything but GWR: the distinctive shape of the tapered boiler, the familiar green, the gleaming copper of the chimney and the promise of speed in the six big driving wheels. Here you see elegance and power in splendid partnership, the essence of the Great Western Railway.

At Didcot there is still enough space to display engines and carriages to advantage, and to feature other aspects of the railway scene, from the strange disc signals of the Brunel era to a demonstration of how to collect a mailbag on a moving train. It is all there to be picked over at leisure – the GWR on display like a composite picture. Many of the elements I enjoy can be found here, but it by no means represents the complete railway story, and certainly not the whole story of steam. The Great Western Railway may have a grand history, but the age of steam was a century old when the first locomotive rolled out on to Brunel's broad-gauge tracks. In my travels in search of steam I found myself hopping through time as well as trundling through the country. No two places were ever the same: diversity rules, thank heavens. Perhaps just one theme ran through every journey I made. Whenever I saw living steam, I found people who had worked with love, and generally for love, to bring that world of steam to life.



## Chapter 2

### Pumps and Paddles

This is the first half of a circular journey – geographically and chronologically – from London around the south-east, and from the start of the steam story to the last stage of steam railway development. The beginning of the story was not in the world of transport, but in the need for mines to pump water from great depths, and it began as far back as the end of the seventeenth century.

Thomas Savery received a patent for a ‘New Invention for raising of water ... by the impellant force of Fire’ in 1698, and he manufactured this machine at a workshop near the Thames in London. The building has long gone and the site is now a playground, with not even a

plaque to mark where the steam age was born. Not that Savery’s engine was especially successful; nor was it very like subsequent engines. It worked by using the pressure of steam to force water up from the bottom of the mine. This meant setting a boiler below ground. The engine was referred to by Savery as ‘The Miner’s Friend’, but as the colliers watched Savery’s giant kettle being installed and a fire lit beneath it, they must have felt that with friends like that they had no need of enemies. Open fires and explosive gases are not generally felt to be compatible with the highest standards of safety.

Savery’s engine may not have been the perfect answer to the problem of

**A railway rarity:** a GWR steam railcar at Didcot. (Great Western Society)





removing water from mines, but it set others thinking about the possibilities of using steam, among them Thomas Newcomen. His pumping engine was gloriously simple in concept. Take a large open-topped cylinder and put a piston in it. Let steam into the space below the piston, forcing the air out until the whole chamber is filled with steam, then spray cold water on to the cylinder. The steam will condense, creating a vacuum, and air pressure will force the piston into the cylinder. To make a pumping engine, all you have to do is hang the piston rod off one end of a beam pivoted at the centre and hang pump rods from the opposite end of the beam. Without steam, the weight of the pump rods would naturally pull the beam down in that direction, but with this process the piston can be forced down, pulling the pump rods up. Endlessly repeating the process causes the beam to sway to and fro and the pump to move up and down steadily.

The Newcomen engine worked, and soon massive beam engines began to appear at Britain's collieries. Unfortunately, vast quantities of coal were needed to fire the boilers. This was not a problem at a colliery, where you have coal in plenty, but things were different in the case of the metal mines – particularly the tin and copper mines of Devon and

Cornwall, where coal was scarce and expensive. There was a need for a better, more economical machine, a need which was met by our third engineering hero, Mr James Watt.

Watt has been called the father of the steam engine, but so has Thomas Newcomen and so, if rather less frequently, has Thomas Savery. Whether any of them deserves the title, I shall leave the reader to decide. But what was the contribution that gave James Watt his popular claim to the title? Forget all the storybook images of a young lad watching a kettle boiling over and shouting *Eureka*, or the Scots equivalent, and dashing off to invent the steam engine. Reality is less romantic.

The young engineer was, in fact, pondering the practical problem of the inefficiency of the Newcomen engine when he identified the source of the difficulty. Huge amounts of energy were being wasted in heating the cylinder after each stroke, when it had just been doused in a cold spray. In a flash of inspiration he hit on one of those gloriously simple ideas that can change the world. Condensing steam was fine, but why do it in the cylinder? The steam could be condensed in a separate chamber connected to the cylinder; the effect would be the same, but the cylinder could still be kept hot. Having realised that this was part of the answer, he saw the other element of the problem. Heat was being wasted because the cylinder was open to the air. But close the cylinder and air pressure cannot act on the piston. So, said Mr Watt, why use air pressure at all? What is wrong with steam pressure? On one side of the piston you can still create a vacuum, and on the other you can provide the drive by means of steam under pressure. What is more, you no longer need pump rods to hang at one end of the beam, you need only provide steam pressure on alternate sides to make your piston go backwards and forwards. Attach that moving piston rod to a crank and you have the means to turn a wheel.

**The replica** *Firefly* at Didcot. (Great Western Society)



This was the basis of movement in paddle steamer and screw steamer, steam locomotive and traction engine. But the beam engine with its pump rods on one end and its cylinder and piston on the other, which started the whole thing, was to be just as important and still remains in everyday use as a working machine right up to the present day. Over the years the engines were to get ever bigger, ever

more powerful, reaching an apotheosis in that great symbol of Victorian civic improvement: the waterworks supplying the needs of towns and cities. And nowhere in Britain will you see mightier engines than at Kew Pumping Station where, after this long introduction, we begin our travels.

Kew Pumping Station is not difficult to find. It stands near the northern end



**The immense**  
chimney of the former  
Kew pumping station  
dominates this part of  
the West London skyline.  
(London Museum of  
Water and Steam)



of Kew Bridge, and the tall boiler-house chimney is still one of the dominant features of this area of London. It is not the size alone that impresses; it has a style that pleases, the more so perhaps because one does not think of steam engine chimneys as being beautiful; useful certainly, but not noted for elegance. But to the Victorians, the new pumping station was more than a building to house machinery; it was a matter for local pride. The arrival of this new installation meant that decent standards of health and hygiene were available to the householders of London: turn a tap and, as if by miracle, pure, clear water would emerge. The age of taking dirty germ-ridden flows from the Thames had ended. In the mid-nineteenth century the river was so filthy that the curtains in the Houses of Parliament were soaked in disinfectant daily to protect the delicate nostrils of the Honourable Members – and the, no doubt, even more delicately

patrician senses of their Lordships – from what became known as ‘The Great Stink’. At Kew, water was to be pumped to filter beds by the power of steam, for the good of all. So the first glimpse that you get of the station is a statement in one of the approved styles for civic dignity, in this case Italianate, that we are in the presence of mighty works. Today, that same tall chimney is a signpost pointing down to the biggest working engine in Britain, a lure for me and for other steam enthusiasts who hurry along to the base of the chimney and the engine house itself. Once inside, one can only stand and wonder.

Kew Pumping Station is not just a simple building with an engine chuffing away inside. It started out on a comparatively small scale, but success built on success: more water was required, more power needed and more engines were added. They worked away, unnoticed by the world at large, until

**A general** view of the main display area at Kew, which is dominated by the imposing triple-expansion engine at the centre of the picture. (London Museum of Water and Steam)



in 1944 they suffered the fate that was to befall all the great pumping engines: compact electrical pumps took over from the steam giants. Now they have been preserved, restored and joined by a number of smaller brethren specially brought in to turn Kew into 'a living steam museum'. To come to Kew is to see the steam engine at its most majestic, for you will see no bigger anywhere in Britain. The size is impressive enough, goodness knows, but with it goes a sense of serenity, of total control and elegance of movement – elegance in the sense that mathematicians use the word to describe a problem solved with ingenuity and a minimum of complexity. It makes little difference whether you have ever seen a steam engine before, or whether you know how it works, for it is possible to appreciate these great machines simply as objects of beauty. Apart from the sheer scale, it is the perfection of movement, of shining metal bars sliding one against the other or tracing arabesques in the air, that makes the lasting impression. I shall try to give the reader some idea of this purity of movement in a moment, but first the history books will help put these machines into perspective.

We left our steam engine story with James Watt. He was a fortunate man in that, unlike so many inventors, he was able to profit from his own work. He went into partnership with a successful entrepreneur and manufacturer, Matthew Boulton, and they acquired a virtual monopoly of steam engine construction throughout the latter part of the eighteenth century. Watt was like many another, however, in that having made his initial grand advance he was reluctant to take any further steps forward. As far as James Watt was concerned, the steam engine had reached a peak of perfection and, protected by all-embracing patents, he made sure that no one else had the chance to try for better things. This was irritating, especially for the engineers of Cornwall who, more than anyone else,

had an incentive, in the form of high fuel costs, to look for improvements. Their chance came when the clock struck midnight at the end of more than a day or even a year, and the eighteenth century gave way to the nineteenth. James Watt's patents ran out. The Cornishmen rushed to try out their new ideas, and a second golden age of steam was born. Just how successful the Cornishmen were can be seen at Kew.

There are two ways to make a steam engine do more work: increase its size or increase the pressure of the steam. Watt was a low-pressure steam man. The Cornish engineers, who included such redoubtable figures as Richard Trevithick, favoured higher pressures. Then, as demand increased, they set to work improving the pumps, improving the engines, and going for bigger and more powerful machines. New engine works were set up, the two most famous being on the Cornish north coast at Hayle: the Copperhouse Foundry and Harveys. Two of the steam monsters of that period, one from each manufacturer, can be seen here in Kew. We are all accustomed now to the notion of engine cylinders. We have them in our cars, rows of them, the little pistons bobbing up and down at great speed. You could drop the cylinder block from the largest car into one of the Kew engine cylinders and scarcely notice it was there. The earlier of the two, supplied by Copperhouse, was built in 1845. The cylinder is 90 inches in diameter, while the Harvey engine which joined it in 1869 is 100 inches across. The Harvey piston moves up and down for a full 11 feet at each stroke, and this giant among engines could shift 10 million gallons of water a day from the Thames to the householders of West London. The statistics are impressive enough, but they cannot prepare you for the sight of the engines *in situ*, or for the sight of the 90 inch, which is still regularly steamed.

The first surprise is the quietness of the engine room; no clatter or racket,





**The Boulton** and Watt engine at Kew. (London Museum of Water and Steam)

just a gentle sighing and a rumble as if a giant were turning in his sleep in some subterranean cavern. There is no sense of haste; the atmosphere is almost churchlike, heightened by the design, with tall fluted columns supporting and containing the moving engine. High above, the iron beam slowly rocks; a worryingly lightweight affair it was thought at the time, a mere 24 tons, so it was strengthened later just to be on the safe side. From the end of the beam hangs the piston rod – but not quite directly.

There are two apparent irreconcilables

to be reconciled, a circle to be squared. The piston rod must move in a straight line, travelling vertically up and down in the cylinder, but the swinging beam which carries it carves the arc of a circle in the air. The engineer who performed the miracle of squaring the circle was, once again, James Watt. He arranged a shifting parallelogram of metal rods and hung his piston from one corner. It is known as Watt's parallel linkage, but the bald description gives no idea of the beauty of the device at work. The rods shift and slide, solid metal chunks gleaming with reddish-brown oil, moving as gently and smoothly as a silk scarf in a breeze. And here you come to the heart of one of the appeals of steam: a natural force of great power controlled by machines which manage to be at once massive and effortlessly fluent in their motion. Everything is there for you to see, not tucked away but asking to be admired. Everything takes its time from the rhythmic motion of the overhead beam: simple, mechanical linkages take their timing from the nodding steel to open and close the valves which maintain the steady motion. The wisps of steam are the only signs of the power locked up in the tons of moving parts.

You can see other engines here at Kew – a Boulton and Watt of 1820, a fine triple expansion and more – a hall full of them, all nodding and bowing to one another in a stately steam quadrille; but it is the giant engine that draws visitors back again and again. Sometimes I just stand and admire the beauty of its motion, sometimes I ponder over the men who conceived and built such a machine, and occasionally I remember that it was part of a mundane system doing nothing more romantic than ensuring that when you turned a tap in Brentford water came out of it. You need that sort of thought to stop yourself being carried away by fanciful notions.

The setting is undeniably romantic, designed to impress, but what mattered was how well the engines worked, and